

*FESTUCA DENTIFLORA* (POACEAE: LOLIINAE: SECT.  
*GLABRICARPAE*), A NEW SPECIES FROM PERU AND  
TAXONOMIC STATUS OF *F. PRESLIANA*

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ABSTRACT

A new species, *Festuca dentiflora* E.B. Alexeev ex Stančík & P.M. Peterson from the Andes of Peru, is described and illustrated. The new species is a member of *Festuca* subg. *Subulatae* (Tzvelev) E.B. Alexeev sect. *Glabricarpae* E.B. Alexeev and is apparently closely related to *Festuca caldasii* (Kunth) Kunth from Ecuador and Colombia. A key to the species of *Festuca* sect. *Glabricarpae* is included. In addition, the taxonomic status and geographical origin of *F. presliana* is discussed.

RESUMEN

Se describe e ilustra una especie nueva de *Festuca* de los Andes de Perú: *F. dentiflora* E.B. Alexeev ex Stančík & P.M. Peterson. La nueva especie pertenece a *Festuca* subg. *Subulatae* (Tzvelev) E.B. Alexeev sect. *Glabricarpae* E.B. Alexeev, se considera estrechamente relacionada aparentemente con la especie *F. caldasii* (Kunth) Kunth de Ecuador y Colombia. Se presenta también una clave para la determinación de las especies de *Festuca* sect. *Glabricarpae*. Además, se discute el estatus taxonómico y origen geográfico de *F. presliana*.

The Russian botanist, E.B. Alexeev, recognized several specimens with unique features while studying South American material of *Festuca* in the United States National Herbarium (US). Alexeev marked many specimens as new species with herbarium names, however, some of these were never published. The status of some of his proposed new species is problematic since, in many cases, only type material exists, and species concepts in *Festuca* are highly variable. In this paper, we describe a new grass species from Peru based upon a specimen that was selected and given an herbarium name by E.B. Alexeev.

The new species, *Festuca dentiflora* E.B. Alexeev ex Stančík & P.M. Peterson, appears to belong in *Festuca* subg. *Subulatae* (Tzvelev) E.B. Alexeev, sect. *Glabricarpae* E.B. Alexeev, in the subtribe Loliinae, tribe Poeae, and subfamily Pooideae (Soreng et al. 2000). Section *Glabricarpae* is one of four sections (sect. *Elmera* E.B. Alexeev, sect. *Glabricarpae*, sect. *Longiglumes* S.L. Lu, and sect. *Subulatae* E.B. Alexeev) in subg. *Subulatae* (Tzvelev) E.B. Alexeev. Section *Glabricarpae* differs from sect. *Elmera* by having flat leaf blades without prominent ribs, and differs from most species of sect. *Subulatae* by having ovate spike-

lets that are significantly longer (> 11 mm long), scabrous lemmas (usually glabrous in sect. *Subulatae*), significantly longer anthers (3.5–5 mm long), and glabrous ovary apices. While the distribution of species in sect. *Elmera* is restricted to the southwestern North America, sect. *Longiglumes* is known only from China and sect. *Subulateae* is sub-cosmopolitan in its distribution (Lu 1992; Stančík & Peterson 2002). By inclusion of the new species, sect. *Glabricarphae* consists of five species, two (*F. breviglumis* Swallen, *F. chiriquensis* Swallen) restricted to Mesoamerica and three (*F. caldasii*, *F. dentiflora*, *F. woodii* Stančík) found in northern South America (Alexeev 1980, 1982, 1986; Stančík 2001, 2003). Based on morphological comparisons, *F. dentiflora* appears closely related to *F. caldasii* (Kunth) Kunth.

***Festuca dentiflora*** E.B. Alexeev ex Stančík & P.M. Peterson, sp. nov. (**Fig. 1**). TYPE: PERU. DEPARTAMENTO HUÁNUCO. Provincia Baños: U.S. Exploring Expedition of Capt. Wilkes 5 (HOLOTYPE: US-1006459!).

Haec species a *Festuca caldasii* (Kunth) Kunth spiculis 11–12 (non 15–17) mm long., glumis majoribus (inferioribus 4.5–6 non 3.5–4 mm long., superioribus 7–8 non 4.5–6.5 mm long.), lemmate minoribus (8.5–10 non 10–14 mm long.), aristis majoribus (6–8 non 1–3 mm long.) differt.

Perennial, loosely tufted. Culms about 100 cm tall, erect, glabrous, with 2–4 nodes in basal half. Sheaths membranous, glabrous, margins free, innovations extravaginal; auricles absent. Ligules 3.5–4 mm long, membranous, acute, lacinate. Blades (only a fragment seen) 3–4 mm wide, flat, green, glabrous. Panicles about 20 cm long, 10–15 cm wide, ovate; branches erect or sometimes spreading, in pairs at each node, scabrous. Spikelets 11–12 mm long, ovate; florets 4–5 (perfect); rachillas 1.2–1.8 mm long, densely pilose. Glumes lanceolate, brownish-green with membranous margins; lower glume 4.5–6 mm long, 1-veined; upper glume 7–8 mm long, 3-veined. Lowermost lemmas 8.5–10 mm long, lanceolate, coriaceous-membranous, green, hairy, 5-veined; apex bi-dentate with an awn 6–8 mm long; callus glabrous. Paleas almost as long as lemma, membranous, two-keeled, scabrous; apex two-dentate, hairy. Lodicules oblong-lanceolate. Stamens 3; anthers 4.5–5 mm long. Ovary apex glabrous. Caryopses not observed.

*Transversal section of leaf blade*.—Leaf section with many vascular bundles, without ribs; bulliform cells not observed; sclerenchyma under both abaxial and adaxial epidermis discontinuous, without hairs.

*Distribution*.—Known only from the type locality in Peru.

*Etymology*.—The specific epithet, as marked on the specimen by E.B. Alexeev, probably refers to the bi-dentate lemma and palea.

#### DISCUSSION

Section *Glabricarphae* is quite homogenous and all five species (*F. breviglumis*, *F. caldasii*, *F. chiriquensis*, *F. dentiflora*, *F. woodii*) are morphologically very simi-

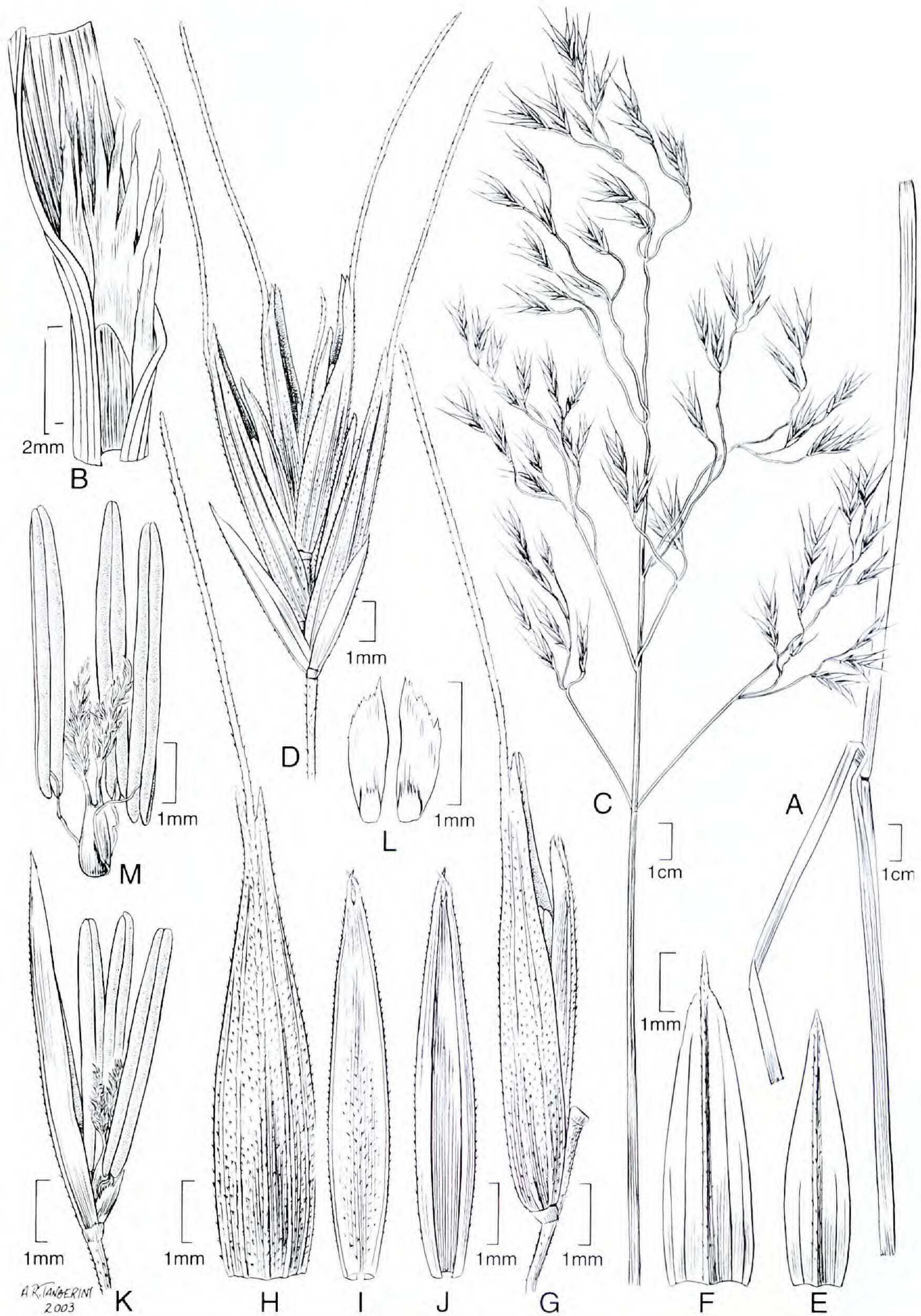


FIG. 1. *Festuca dentiflora* (Wilkes 5). A. Culm (portion of). B. Sheath, ligule, and portion of the blade. C. Inflorescence. D. Spikelet. E. Floret. F. Lower glume, dorsal view. G. Upper glume, dorsal view. H. Lemma, dorsal view. I. Palea, dorsal view. J. Palea, ventral view. K. Palea, lodicules, stamens, and pistil. L. Lodicules (2). M. Stamens and pistil.

lar (Table 1). In comparison with other members of this section, *F. dentiflora* and *F. woodii* have shorter spikelets (11–14 mm long versus 15–20 mm long), *F. dentiflora* and *F. caldasii* have longer ligules (2.5–4 mm long versus 0.5–1.1 mm long), and *F. dentiflora* and *F. breviglumis* have longer awns (6.5–15 mm long versus 0.5–4 mm long).

KEY TO THE SPECIES OF *FESTUCA* SECT. *GLABRICARPAE* IN SOUTH AMERICA

1. Spikelets 10–14 mm long, lemmas 10–16 mm long.
  2. Lower glumes 7–8.5 mm long, upper glumes 9–12 mm long \_\_\_\_\_ ***Festuca chiriquensis***
  2. Lower glumes 3.5–5(–6.5) mm long, upper glumes 4.5–8.5 mm long.
    3. Ligules 0.5–0.8 mm long, lemma awn 7–15 mm long \_\_\_\_\_ ***Festuca breviglumis***
    3. Ligules 0.5–3 mm long, lemma awn 1–3 mm long \_\_\_\_\_ ***Festuca caldasii***
1. Spikelets 15–20 mm long, lemmas 8.5–9.5 mm long.
  4. Ligules 0.5 mm long, lemma awn 0.5–1 mm long, anthers 3.5–3.7 mm long  
\_\_\_\_\_ ***Festuca woodii***
  4. Ligules 3.5–4.5 mm long, lemma awn 0.5–1 mm long, anthers 3.5–3.7 mm long  
\_\_\_\_\_ ***Festuca dentiflora***

Alexeev (1986) also included *F. presliana* Hitchc. in sect. *Glabricarpae*, but the status of this species is not clear (see Table 1). The type specimen of *F. presliana* differs from the other members of sect. *Glabricarpae* by having 3-veined, membranous, and papillate or short scabrous (not long scabrous) lemmas. Since *F. presliana* has lanceolate lemmas with long awns and short anthers it may be more correctly placed in *Festuca* subg. *Subulatae* sect. *Subulatae*. The type specimen of *F. presliana* was originally described as *Bromus depauperatus* J. Presl [Reliq. Haenk. 1(4-5): 263.1830] from a specimen (*Haenke s.n.*) collected by the Czech botanist, Thaddaeus Peregrinus Xaverius Haenke, as a member of Malaspina Expedition (1789-1793). Haenke collected about 15,000 plant specimens on this expedition. However, a large part of this material was destroyed during transportation (Stern 1973) and only a small part of the collection reached the European continent and was finally acquired by Kaspar von Sternberg in 1821 for the National Museum in Prague. Under the leadership of K.B. Presl, processing and determination of this material and results were published in *Reliquiae Haenkeanae* (Presl 1825-30, 1831-35). New grass species were described by J.S. Presl. A major part of this collection has recently been deposited in the National Museum Herbarium in Prague (PR), and duplicate sets can be found in the Herbarium of Charles University in Prague (PRC) and in other herbaria (K, MO, US, W).

A taxonomic revision of *Festuca* in Colombia has recently been completed by the senior author (Stančík 2003), and the status of *F. presliana* is still unclear. While Presl described the type specimen as *Bromus depauperatus* and mentioned “sinu Nootka” (=Vancouver Island) as the type locality, Hitchcock (1927) in his treatment of South American grasses, transferred this taxon to the genus *Festuca* and created a new name *F. presliana* Hitchcock to replacing the

TABLE 1. Morphological comparison of the South American species of *Festuca* sect. *Glabricarpae* and *F. presliana*.

<b>Taxon</b>	<b><i>F. caldasii</i></b>	<b><i>F. woodi</i></b> (in press)	<b><i>F. breviglumis</i></b>	<b><i>F. chiriquensis</i></b>	<b><i>F. dentiflora</i></b>	<b><i>F. venezuelana</i></b> (in press)	<b><i>F. presliana</i></b>
<b>Herbarium</b>	PRC	COL	US	Taken from description in Davidse (1994)	US	US	PR
<b>Collector</b>	<i>S. Laegaard</i>	<i>J.R.I. Wood</i>	<i>R. McVaugh</i>		<i>C. Wilkes</i>	<i>E.P. Killip</i>	<i>T.P.X. Haenke</i>
<b>Number</b>	20405	5254	24827		5	19719	s.n.
<b>Geographical distribution</b>	Colombia, Ecuador	Colombia	Mesoamérica (Mexico- Panama)	Mesoamérica (Mexico- Panama)	Peru	Colombia, Venezuela	not clear (see discussion)
<b>Culm height (cm)</b>	70–150	80	55–130	80–130	100	120	70
<b>Sheath base</b>	slightly fibrous	fibrous	slightly fibrous	slightly fibrous	?	fibrous	fibrous
<b>Ligule size (mm)</b>	2.5–3	0.5	0.5–0.8	0.5–1.1	3.5–4	2.5–3	0.5–0.8
<b>Ligule apex</b>	acute	truncate	?	?	acute	truncate	truncate
<b>Blade length (cm)</b>	20–35	50–60	19–35	15–50	?	25	27
<b>Blade width (mm)</b>	3–9	2.5–5	5–8	4–7	3–3.5	6–9	5.5–6.5
<b>Panicle size, length × width, (cm)</b>	13–17 × 5–8	15 × 20	15 × 17–22	10–15 × 15–30	20 × 10–15	20 × 17	17 × 10
<b>Spikelet length (mm)</b>	15–17	12–14	15–20	15–20	11–12	12	10–12
<b>Number of florets</b>	5–7	4–5	4–5	?	4–5	5	2 (not complete)
<b>Lower glume length (mm)</b>	3.5–4(5)	4.5–5.5	3–5(6.5)	7–8.5	4.5	5–6	4–5
<b>Upper glume length (mm)</b>	4.5–6.5	6–7.5	5–8.5	9–12	7–8	6–7	5.5–6.5
<b>Lemma length (mm)</b>	10–14	8.5–9	13–15.5	14–16	8.5–9.5	8–9	9.5–10
<b>Lemma apex</b>	two-dentate	two-dentate	two-dentate	two-dentate	two-dentate	two dentate	two-dentate
<b>Number of lemma veins</b>	5	5	5	5	5	5	3
<b>Awn length (mm)</b>	1–3	0.5–1	7–15	1–4	6.5–8	6–9	8
<b>Anther length (mm)</b>	3.5–4.5	3.5–3.7	2.5–5.2	3–4.5	4.5	1.7–2	2.5
<b>Ovary apex</b>	glabrous	glabrous	glabrous	glabrous	glabrous	not seen	glabrous

blocking name, *F. depauperata* Bertol (Fl. Ital.1: 620.1834). Hitchcock also discussed the geographical origin of this specimen comparing Haenke's collection with the specimen of Wilkes Expedition (type specimen described here as *F. dentiflora*). Hitchcock concluded that the type locality published by Presl was in error because neither the specimens nor the description corresponds with any North-American species of *Festuca*. Hitchcock, suspected the "true identity" of the *F. presliana* type to be from Baños, Peru. This opinion, at first, appeared highly probable because a large portion Haenke's specimens come from Huánuco region of central Peru (Fig. 1b in Kühnel 1960). In the Flora of Peru, Macbride (1936) also accepted Hitchcock's opinion.

Alexeev (1986) opened a new discussion on the geographical origin Haenke's specimen and compared the northern South American collections of *Festuca* with a specimen of Killip [Killip & Smith 19719 (US)] from the Cordillera Oriental of Colombia. Alexeev concluded that Hitchcock's opinion of the Peruvian origin was erroneous and that *Festuca presliana* is a species endemic to Colombia.

There are no doubts about the placement of Haenke's specimen in the genus *Festuca* since it has an open sheath, glabrous ovary, and a caryopsis that does not adhere to the lemma. A comparison of the type specimens of Haenke s.n. (*F. presliana*) and Wilkes 5 (*F. dentiflora*) with the Killip & Smith specimen, suggests that Peruvian and Colombian origin of *F. presliana* are in error. The specimens do not represent the same species (see Table 1 for comparison). The Peruvian specimen (Wilkes 5) is described here as a new species (*F. dentiflora*), and the Killip & Smith specimen represents a new species (*F. venezuelana*) from Venezuela (Stančík 2003). In addition to the specimen comparisons above, a reconstruction of Haenke's itinerary in South America indicates (Fig. 1a & b in Kühnel 1960) that he never reached the Cordillera Oriental of Colombia. A re-examination of Haenke's specimen using Hitchcock and Chase (1951), Soderstrom and Beaman (1968), Stewart and Hebda (2000), Serna and López-Ferrari (2000), Beetle (1991), Macbride (1936), Pinto-Escobar (1981), and Davidse (1994) also excluded the possibility that it is of American origin.

The most important morphological feature distinguishing *F. presliana* is the 3-veined lemma, that is commonly 5-15-veined in *Bromus* and usually 5-veined in *Festuca*. Interestingly, there are only five known species of *Festuca* with 3-veined lemmas. In addition to *F. presliana*, Clayton and Renvoize (1986) mentioned the following four species with 3-veined lemmas: *F. africana* (Hack.) Clayton and *F. engleri* Pilg. From Africa, *F. altissima* Boiss. from Eurasia, and *F. athenica* Hook. f. from Asia. All of these species come from the Old World. The two African species are placed in the wide-spread, *Festuca* Subg. *Subulatae* (Stančík in prep.), whereas the Eurasian/Asian species are alligned with *Festuca* Subg. *Drymanthele* (Alexeev 1977). The occurrence of taxa with 3-veined lem-

mas in the Old World is remarkable. However, use of this observation as support for the extra-American origin of this Haenke type is probably insufficient. Other cases of confusion in the location of Haenke's collections are known, for example, Alston (1934), Lamson-Scribner (1899), Merrill (1906), and Veldkamp et al. (1991). Frequently there is confusion with reports of South American species as occurring in Luzon (Philippines) and vice versa. Revision of *Bromus* and *Festuca* in the Philippines is needed and could clear up some of this confusion.

#### ACKNOWLEDGMENTS

We wish to thank the Smithsonian Institutions, Fellowships and Grants for supporting a research visit by the senior author to the United States National Herbarium and curators from the following herbaria: AAU, B, COL, LPB, MA, PR, PRC, QCA, QCNA, VEN, and W. Financial aide to visit herbarium collections was made possible by support from GAČR (No.206/01/0687) and a grant from the Ministry of Education of Czech Republic (No.313004). Appreciation is extended to Alice R. Tangerini for providing the illustrations; Dan Nicolson for correcting the Latin diagnoses; and to Kelly W. Allred, Barney Lipscomb, and Stephan L. Hatch for reviewing the manuscript.

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